

Name _____ Surname _____ Student ID. _____

DUE DATE : Tuesday 9th, February 2016.

Assignment 1: (10 marks)

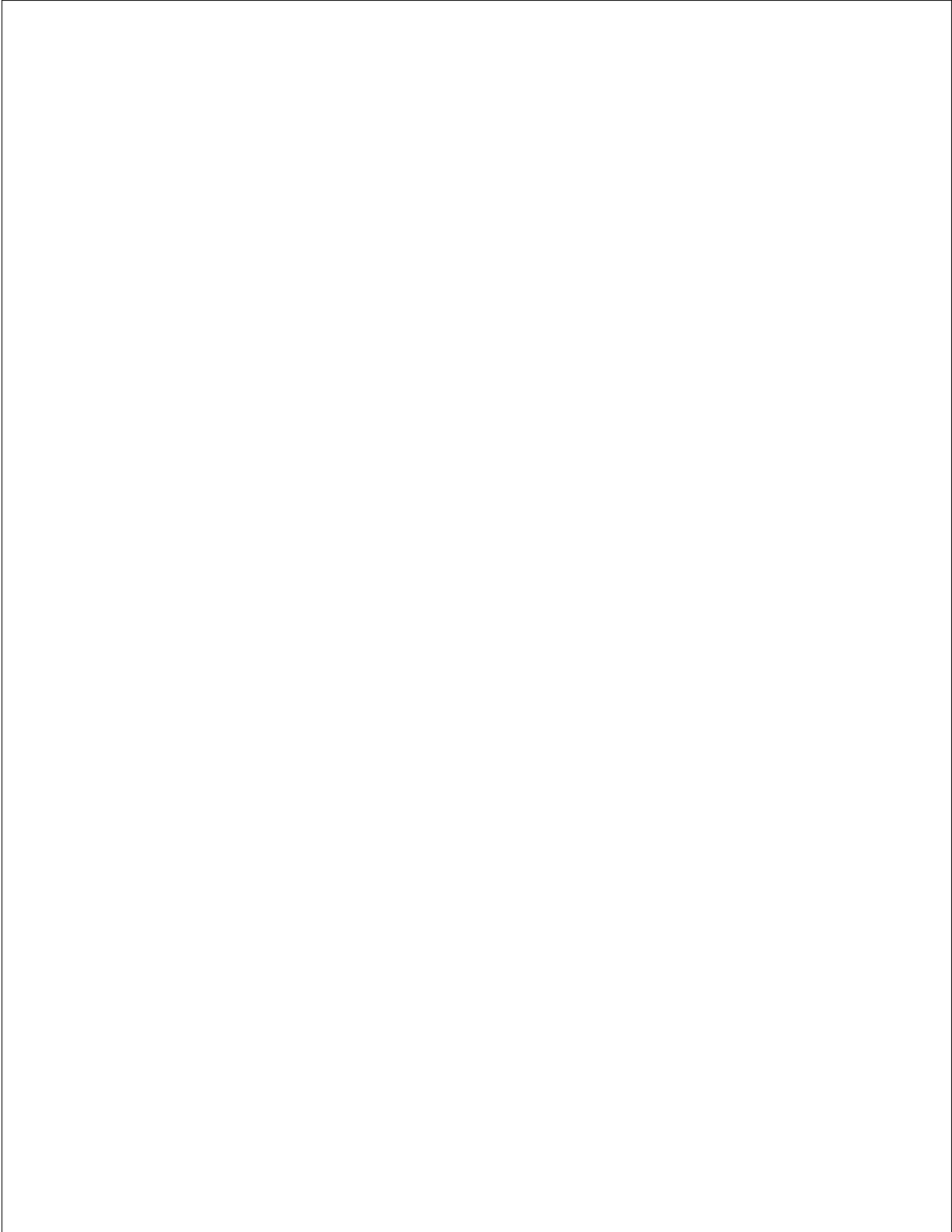
I pledge to the Honor Code and to obey all rules for taking and performing homework assignments as specified by the course instructor.

Student Signature: _____

1. Let X and Y have the joint probability density function specified in the following table.

		X			
		0	1	2	
Y	0	0	0.20	0.10	$f(Y = 0)$ =
	1	0.20	0.40	0	$f(Y = 1)$ =
	2	0.10	0	0	$f(Y = 2)$ =
		$f(X = 0)$ =	$f(X = 1)$ =	$f(X = 2)$ =	

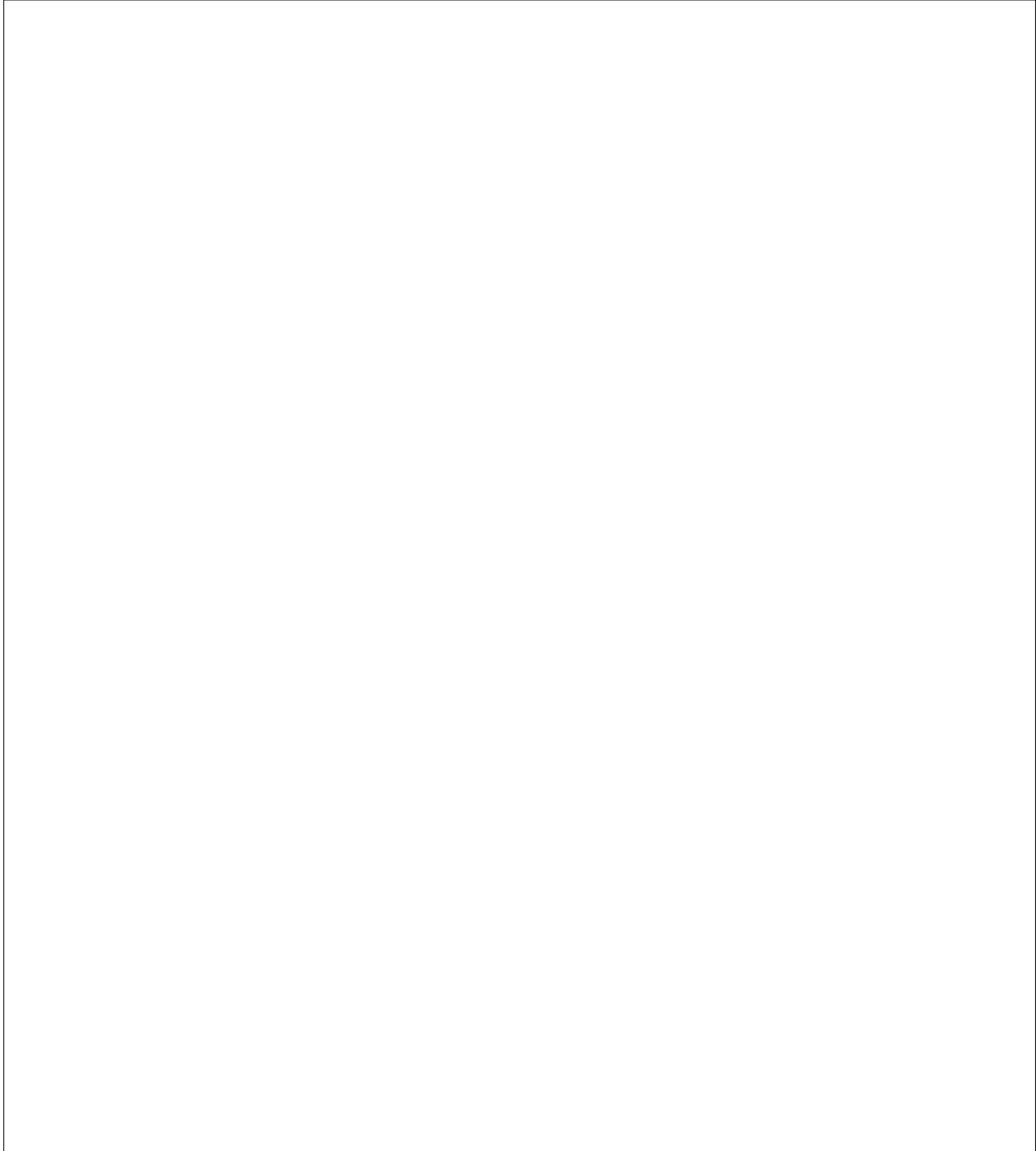
[1]. Find $E(X^2|Y = 2)$ and $var(X|Y = 2)$



2. Suppose the joint distribution of X and Y is such that

$$E[X] = 5 \quad E[X^2] = 30 \quad E[Y|X] = 3X \quad E[XY|X] = 3X^2 \quad Var[Y] = 81$$

Find (a) $Cov(X, Y)$ and (b) $Corr(X, Y)$



3. Let X and Y be random variables with the following joint distribution

$$f(x, y) = P(X = x, Y = y) = 1/8$$

If $x \in \{-1, 0, 1\}$ and $y \in \{-1, 0, 1\}$ BUT $(x, y) \neq (0, 0)$

Show that the $\text{Cov}(X, Y) = 0$ BUT X and Y ARE NOT INDEPENDENT.

4. Show the derivation if X and Y are two **independent random variables**, then

$$\text{var}(X + Y) = \text{var}(X) + \text{var}(Y)$$

5. If X_1, X_2, X_3 is a random sample from a population with mean μ and variance σ^2 . X_1, X_2, X_3 **ARE NOT independent** $cov(X_1, X_2) = cov(X_1, X_3) = cov(X_2, X_3) = \frac{1}{3}\sigma^2$ and \bar{X} is an estimator used to estimate mean value where $\bar{X} = \frac{1}{3}(X_1 + X_2 + X_3)$. Find $E(\bar{X})$ and $var(\bar{X})$